Computer Science 360
Midterm Examination

Time: 75 minutes November 4, 2003
Marks

20 1. Let $G = (V, A)$ be a directed graph where each edge is given a positive integer length. Design an $O(n^3)$ time algorithm to find the length of the minimum length cycle in G.

20 2. An undirected graph is unicyclic if it contains exactly one cycle. Describe an $O(n + e)$ time algorithm for determining whether or not a given graph, with n vertices and e edges, is unicyclic.

20 3. [Degree 3 Spanning Tree] Given an undirected graph $G = (V, E)$, the Degree 3 Spanning Tree problems is to determine whether or not there exists a spanning tree $T = (V, E')$ for G in which no vertex in V has more than three adjacent edges in E'.

Describe a backtracking algorithm for the Degree 3 Spanning Tree problem. Explain the state space organization used.